Habitat Use and Head-Starting of Mojave Desert Tortoises

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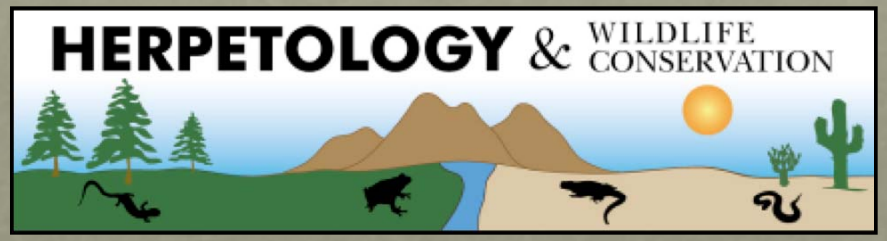


Acknowledgments

- **Debra Hughson**, Science Advisor, Mojave National Preserve, National Park Service

- **Roy Averill-Murray**, Desert Tortoise Recovery Coordinator, US Fish and Wildlife Service

Research Team

- **Kurt Buhlmann**, Associate Research Scientist, Savannah River Ecology Lab, University of Georgia

The University of Georgia
Savannah River Ecology Laboratory

  - Reintroductions, translocations, and head-starting of Gopher tortoises in SC.

  - Head-starting and translocations of Blanding's turtles in MA.

  - Creation of artificial nesting habitat for Wood turtles in NJ.

Research Team

- **Tracey Tuberville**, Assistant Research Scientist, Savannah River Ecology Lab, University of Georgia

The University of Georgia
Savannah River Ecology Laboratory

  - Reintroductions, translocations, and head-starting of Gopher tortoises in SC and GA.

  - Reproduction and social structure of Gopher tortoises in SC and GA using molecular techniques.

  - Head-starting and translocations of Blanding's turtles in MA.

Defining the problem

- Increased investment in solar and wind renewable energy.
- Rapid development and increased use of California deserts.
- Possible negative impacts to desert ecosystems and sensitive and protected species.

Defining the opportunities

- Informing where and how development occurs to minimize impacts to desert species.
  - Requires improved knowledge of distribution and habitat use of rare/sensitive species.
- Investing in strategies that promote the preservation and persistence of rare/sensitive species elsewhere to offset negative impacts where they cannot be avoided.
  - Requires improved knowledge of efficacy/applicability of various management strategies for rare/sensitive species.

Mojave desert tortoises

- Public icon for California deserts.
- Protected as a threatened species by both state and federal law.
- Still declining in several parts of its range, likely from reduced adult survival and low juvenile recruitment.

Photo: Ken Nussear, USGS

The missing years

- Juvenile tortoises less frequently encountered.
- Lower survival than adults.
- Historically difficult to study.
- Most studies have focused on adults.

Photo: Melia Nafus, UC Davis

Primary research goals

- Better inform questions about habitat suitability as it relates to improved recruitment/survival of juvenile tortoises.
  - Identify features conducive to survival.
  - Inform location of future development.
- Inform our understanding of the applicability of head-starting of desert tortoises as a mitigation tool to facilitate population recovery in protected habitats.
  - Increased importance of persistence in preserves.

Head-starting defined

- The hatching and rearing of turtles through an early part of their life cycle.
  - Heppell et al. 1996. *Ecological Applications*.

- To increase survivorship via the protection of juvenile turtles until they are less susceptible to predators upon release.
  - Hazard and Morafka 2002. *Chelonian Conservation and Biology.*

Prescriptions for head-starting

- 2008 Draft Revised Recovery Plan (USFWS)
  - 3.1: “Develop protocols and guidelines for the population augmentation program, including those specific to head-starting…”

Role of head-starting

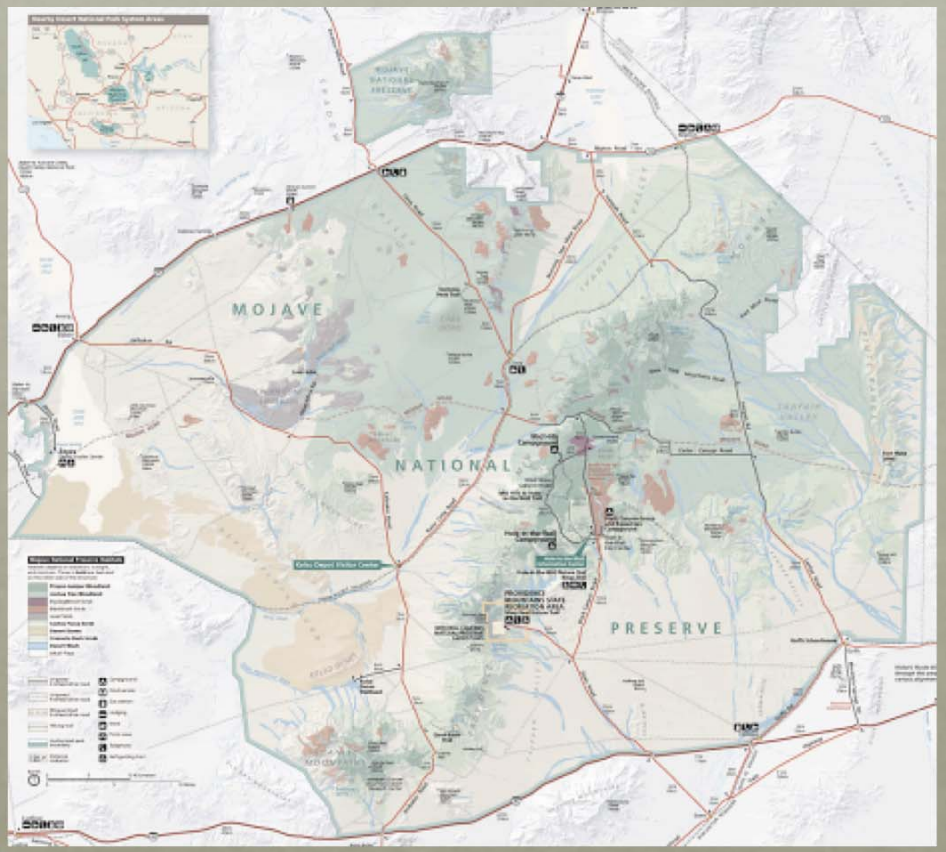
- Cannot substitute for loss of adults or long-term reductions in adult survival.
- "However, successful captive rearing programs can produce large cohorts to "boost" a recovering population…"
  - Heppell. 1998. *Copeia*.
- Short-term intervention and management tool to increase/augment populations.

Maximizing head-starting effectiveness

- "… a shorter generation time increases the potential benefits of head-starting."
  - Heppell et al. 1996. Ecological Applications.

- Supplemental rainfall in western Mojave has been shown to increase growth rates of captive tortoises.
  - Nagy, Hillard, Tuma et al. at Edwards, Fort Irwin, and Twentynine Palms.

Study Site



Mojave National Preserve

Study Site

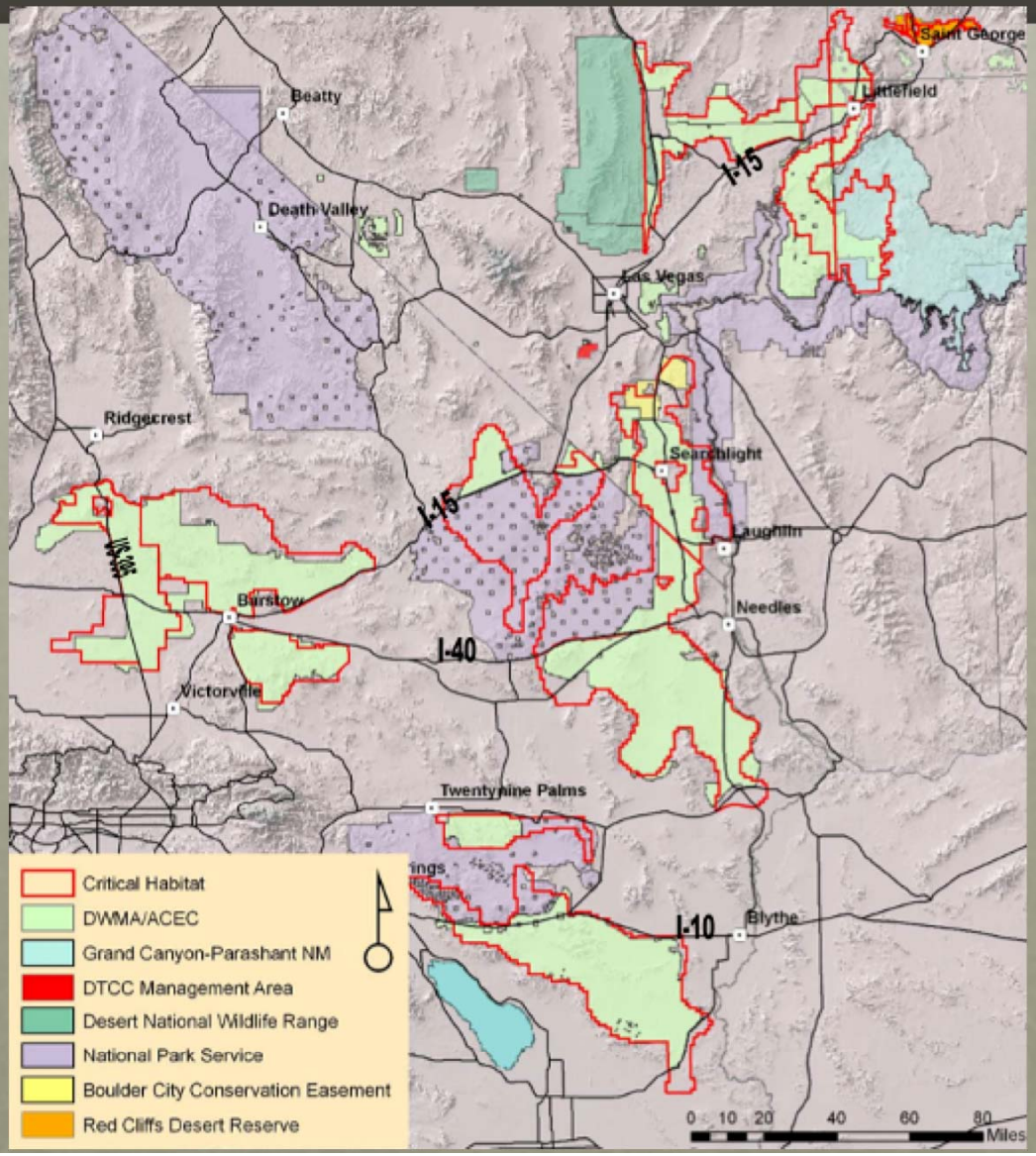


Fig. 2
2008 Draft Recovery Plan. USFWS

Ivanpah Desert Tortoise Research Facility

Ivanpah Desert Tortoise Research Facility

Basic procedures

- Collect females in adjacent habitat.
- Allow them to nest in predator-proof outdoor enclosures.
- Release females and allow eggs to incubate.
- Upon hatching, establish 3 experimental groups:
  1) Direct releases
  2) Head-started animals
  3) Head-started animals receiving supplemental rain

Experimental group 1

- Direct release hatchlings will be fitted with radio-transmitters and released at pre-selected release sites.
- Locate them twice weekly.
- Identify any sources of mortality, as well as quantify habitat use based on vegetation sampling, topography, soil type, and other factors.
- Record GPS points.

Gopher tortoises fitted with radio-transmitters.
Photo by Matt Hinderliter, US Army, Camp Shelby

Experimental group 2

- Will be maintained outdoors in semi-natural conditions with predators excluded.
- Will not receive supplemental rainfall.
- Will be held captive until approximately 105mm carapace length.
- Will be fitted with radio-transmitters upon release.
- Additional post-release data collected.

Hatchling desert tortoise seeking afternoon shade.
Photo: Tracey Tuberville, SREL

Experimental group 3

- Will be maintained outdoors in semi-natural conditions with predators excluded.
- Will receive supplemental rainfall.
- Will be held captive until approximately 105mm carapace length.
- Will be fitted with radio-transmitters upon release.
- Additional post-release data collected.

Young tortoise active in early morning.
Photo: Brian Todd, UC Davis

Outdoor enclosures

Photo: Tracey Tuberville, SREL

Timeline

- New cohort of hatchlings started in each of 3 consecutive years beginning 2011.
- Habitat use of all released animals in each year will be monitored continuously throughout duration of project (or to mortality).
- Survival and growth of all animals will be monitored continuously throughout duration of project.
- Record morphometric data at each transmitter replacement.

Habitat use data

- Determine landscape and vegetation community characteristics selected by young tortoises at the microhabitat scale.
- Identify those characteristics associated with highest survival and growth.
- Will allow us to evaluate potential sites for planned infrastructure development.
- Identify future release sites to promote recovery of the species.
- Inform potential habitat restoration and improvement to recover degraded habitat.

Efficacy of head-starting

- To what extent do our head-starting treatments increase growth and survival of young tortoises?
- To what extent will rain supplementation have a positive effect on tortoise growth rates?
- Is this a viable, feasible option to support the recovery and persistence of desert tortoise populations?

The End

- Thanks to **Misa Milliron** and **Linda Spiegel**, the CEC PIER Environmental Area, and the **California Energy Commission**